09.0 POWER/ENERGY AND TRANSPORTATION SYSTEMS I

Prerequisite: Fundamentals of Technology
Students enrolled in this course will explore sources, storage, transportation, consumption, control, environmental impacts, and conservation of power, energy and transportation. Land, ground effects, water, air, space, and intermodal transportation systems will be explored with practical activities emphasizing relevant scientific and engineering concepts. Activities include defining problems, designing prototypes, using computer-assisted applications, constructing models, and testing prototypes using appropriate tools such as wind tunnels and performance tests.

PROGRAM TASK LISTING EFFECTIVE DATE: June 30, 1995

PROGRAM AREA: Technology Education

PROGRAM TITLE: Power/Energy and Transportation Systems I

IDAHO CODE NUMBER: TE 1940

09.01 Demonstrate the ability to work safely with a variety of technologies.

09.02 Demonstrate interpersonal skills as they relate to the workplace.

09.03 Identify and apply methods of information acquisition and utilization.

09.04 Apply basic skills in communications, mathematics, and science appropriate to technological content and learning activities.

09.05 Demonstrate and apply design/problem-solving processes.

09.06 Discuss individual interests and aptitudes as they relate to a career.

09.07 Make an informed and meaningful career choice.

09.08 Demonstrate technical knowledge and skills about energy technology.

09.09 Demonstrate technical knowledge and skills about power technology.

09.10 Demonstrate technical knowledge and skills about transportation technology.

09.11 Perform independent-study and technical skills related to energy, power, or transportation technology.

PROGRAM TASK LISTING EFFECTIVE DATE: June 30, 1995

PROGRAM AREA: Technology Education

PROGRAM TITLE: Power/Energy and Transportation Systems I

IDAHO CODE NUMBER: TE 1940

09.01 DEMONSTRATE THE ABILITY TO WORK SAFELY WITH A VARIETY OF TECHNOLOGIES--
The student will be able to:

1. Select appropriate tools, procedures, and/or equipment needed to produce a product.
2. Demonstrate the safe usage of appropriate tools, procedures, and operation of equipment needed to produce a product.
3. Demonstrate knowledge required to maintain and troubleshoot equipment used in a variety of technological systems.
4. Follow laboratory safety rules and procedures.
5. Demonstrate good housekeeping at work station within total laboratory.
6. Identify color-coding safety standards.
7. Explain fire prevention and safety precautions and practices for extinguishing fires.
8. Identify harmful effects/potential dangers of familiar hazardous substances/devices to people and the environment.

09.02 DEMONSTRATE INTERPERSONAL SKILLS AS THEY RELATE TO THE WORKPLACE--
The student will be able to:

1. Perform roles in a student personnel system or in the Idaho Technology Student Association (Idaho TSA).
2. Participate as a member of a team.
3. Teach others new skills.
4. Identify skills needed to serve clients/customers.
5. Demonstrate leadership skills.
6. Describe strategies necessary for negotiating agreements.
7. Demonstrate the application of skills necessary to work with people of diverse backgrounds.
8. Form an understanding and appreciation for work after listening to or observing technology workers.
9. Form an understanding and appreciation for work after participating in a simulated technology group project in the laboratory.
10. Form an understanding and appreciation for the roles and work of co-workers.

09.03 IDENTIFY AND APPLY METHODS OF INFORMATION ACQUISITION AND UTILIZATION--
The student will be able to:

1. Define terms related to computers.
2. Identify and describe methods of information acquisition and evaluation.
3. Discuss advantages and disadvantages in the application of technologies.
4. Produce a plan to organize and maintain information relevant to emerging technologies.
5. Comprehend and communicate information relevant to emerging technologies.
6. Demonstrate the use of computers to process information.
7. Demonstrate the ability to gather information using media centers, electronic communications (i.e. computer networking) and emerging media (CD-ROM, laser disk, etc.)

09.04 APPLY BASIC SKILLS IN COMMUNICATIONS, MATHEMATICS, AND SCIENCE APPROPRIATE TO TECHNOLOGICAL CONTENT AND LEARNING ACTIVITIES--
The student will be able to:

1. Identify and explain the main and subordinate ideas in a written work.
2. Distinguish different purposes and methods of writing, identify a writer's point of view and tone, and interpret a writer's meaning.
3. Define unfamiliar words by use of structural analysis, decoding, contextual clues, or by using a dictionary.
4. Distinguish fact from opinion.
5. Read critically by asking pertinent questions, by recognizing assumptions and implications, and by evaluating ideas.
6. Select, relate, and organize, ideas using outlining and/or graphic organizers and develop the ideas in coherent paragraphs.
7. Improve one's own writing by restructuring, correcting errors, and rewriting.
8. Gather and organize information from primary and secondary sources; write a report using this research; quote, paraphrase, and summarize accurately; and cite sources properly.
9. Vary one's writing style, including vocabulary and sentence structure, for different readers and purposes.
10. Write logical and understandable statements, or phrases, to accurately fill out commonly used forms.
11. Compose unified and coherent correspondence, directions, descriptions, explanations and reports.
12. Participate critically and constructively in the exchange of ideas, particularly during class discussions and conferences with instructors.
13. Conceive and develop ideas about a topic for the purpose of speaking to a group; choose and organize related ideas; present them clearly in Standard English; and evaluate similar presentations by others.

14. Use the mathematics of:
    - integers, fractions, and decimals;
    - ratios, proportions, and percentages;
    - roots and powers;
    - algebra;
    - geometry.
15. Make estimates and approximations, and judge the reasonableness of a result.
16. Use elementary concepts of probability and statistics.
17. Draw, read, and analyze graphs, charts, and tables.
18. Ask appropriate scientific questions and recognize what is involved in experimental approaches to the solutions of such questions through familiarity with laboratory and field work.
19. Organize and communicate the results obtained by observation and experimentation.
20. Apply the basic principles of biology, physics, and chemistry. (Properties of matter; structure of compounds; concepts of motion; temperature, pressure and volume; work, power, force and energy; machines; human cell structure).
21. Identify problems rooted in basic biology, physics, or chemistry (effects of hazardous materials on health and safety, effects of drugs on health, trouble shooting problems on a machine).

09.05 DEMONSTRATE AND APPLY DESIGN/PROBLEM-SOLVING PROCESSES--
The student will be able to:

1. Describe and explain steps in the design/problem-solving process.
2. Propose solutions to given problems.
3. Design and implement the optimal solution to a given problem.
4. Document each step of the design/problem-solving process.
5. Demonstrate "Brainstorming" as a process to solve problems.
6. Define "critical thinking" and its value in the problem-solving process.

09.06 DISCUSS INDIVIDUAL INTERESTS AND APTITUDES AS THEY RELATE TO A CAREER--
The student will be able to:

1. Describe individual strengths and weaknesses.
2. Discuss individual interests related to a career.
3. Identify careers within specific areas of technology.
4. Explore careers within specific areas of interest.

09.07 MAKE AN INFORMED AND MEANINGFUL CAREER CHOICE--
The student will be able to:

1. Make a tentative occupational choice based on the information learned and interest developed in this course.
2. Review tentative occupational choices based on the information learned and interest developed in this course.

09.08 DEMONSTRATE TECHNICAL KNOWLEDGE AND SKILLS ABOUT ENERGYTECHNOLOGY--
The student will be able to:

1. Demonstrate knowledge and understanding of sources of thermal energy.
2. Demonstrate knowledge and understanding of sources of radiant energy.
3. Demonstrate knowledge and understanding of sources of nuclear energy.
4. Demonstrate knowledge and understanding of sources of chemical energy.
5. Demonstrate knowledge and understanding of sources of electrical energy.
6. Demonstrate knowledge and understanding of sources of mechanical energy.
7. Demonstrate knowledge and understanding of sources of fluid energy.
8. Define Energy.
9. Use units of energy measurement to calculate input and output.
10. Apply knowledge of energy technology in making a working system.

09.09 DEMONSTRATE TECHNICAL KNOWLEDGE AND SKILLS ABOUT POWER TECHNOLOGY--
The student will be able to:

1. Define Power
2. Demonstrate method of measuring power
3. Demonstrate knowledge, understanding and application of simple machines.
4. Calculate problems using power ratio.
5. Demonstrate an understanding of hydraulic/pneumatic power control.
6. Set up and Calculate power problems.
7. Demonstrate knowledge and applications in controlling power. Electricity/Electronics - AC/DC, Components, Digital electronics/logic circuits, Hydraulic/pneumatic, Mechanical
8. Identify methods of power transmission.
9. Demonstrate knowledge and understanding of heat engines, their parts and operation.
10. Students will be able to solve problems using more than one method of power control.

09.10 DEMONSTRATE TECHNICAL KNOWLEDGE AND SKILLS ABOUT TRANSPORTATION TECHNOLOGY--

The student will be able to:

1. Understand historical development of each transportation system.
2. Understand and apply the theories of each transportation system in developing efficient working models.
3. Design and construct vehicles in each transportation system.
4. Demonstrate knowledge of land transportation.
5. Demonstrate knowledge of ground effect transportation.
6. Demonstrate knowledge of air transportation.
7. Demonstrate knowledge of space transportation.
8. Demonstrate knowledge of marine transportation.
9. Illustrate or design an intermodal transportation system.

09.11 PERFORM INDEPENDENT-STUDY AND TECHNICAL SKILLS RELATED TO ENERGY, POWER, OR TRANSPORTATION TECHNOLOGY--

The student will be able to:

1. Select an individual or group project in cooperation with the teacher.
2. Work with a mentor from the school or community to help complete the project.
3. Develop a written plan of work to carry out the project.
4. Show evidence of technical study in support of the project.
5. Perform skills related to the project.
6. Complete the project as planned.
7. Collect or produce data on energy and power through the operation of computer.